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PRINCIPAL INVESTIGATOR: Charles R. Marmar, M.D.

CONTRACTING ORGANIZATION:
New York University School of Medicine

New York, NY 10016

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550 First Avenue
New York, NY 10016

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14. ABSTRACT
This study is a randomized controlled trial to investigate the feasibility and effectiveness of a brief Anxiety Reduction Treatment for Acute Trauma (ARTAT) with adults (over age 18) showing signs of peritraumatic anxiety in the Emergency Department of Bellevue Hospital, New York in the hours following a psychologically traumatic event. Thirty-six participants will be enrolled over a 12-month period (18 receiving ARTAT and 18 receiving Treatment As Usual (TAU). The study will target anxious arousal in patients immediately following a trauma.

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ABSTRACT

This study is a randomized controlled trial to investigate the feasibility and effectiveness of a brief Anxiety Reduction Treatment for Acute Trauma (ARTAT) with adults (over age 18) showing signs of peritraumatic anxiety in the Emergency Department of Bellevue Hospital, New York in the hours following a psychologically traumatic event. Thirty-six participants will be enrolled over a 12-month period: 18 receiving ARTAT and 18 receiving Treatment As Usual (TAU). The study will target anxious arousal in patients immediately (1 to 8 hours) following a trauma. Participants will be recruited from among patients who present in the Emergency Department at Bellevue Hospital for treatment of an injury sustained in a traumatic event (accident, assault) as long as injuries do not preclude participation. Participants included in the study will have experienced a trauma within 8 hours and presenting with signs of a strong risk factor for PTSD: peritraumatic panic (severe psychological and physiological anxiety symptoms such as fear of dying, fear of losing emotional control, tachycardia, sweating, shaking and dissociation symptoms such as derealisation and depersonalization that occur during and immediately following a trauma. Following the initial assessment, eligible participants will be randomized to receive the one-hour anxiety-reduction intervention designed to reduce anxiety and panic symptoms through education and anxiety y management skills or TAU. The clinician administered and self-report assessments will be conducted at screening, baseline, post-treatment, weekly, and at a one-month and three-month follow-up.

INTRODUCTION

The purpose of the proposed research is to pilot a behavioral intervention specifically designed to reduce the symptoms of peritraumatic panic, in order to reduce the likelihood of subsequent PTSD. We have developed the Anxiety Reduction Treatment for Acute Trauma (ARTAT), a one-session intervention targeting at-risk individuals (those continuing to experience peritraumatic panic following a trauma) and enhance self-efficacy. The intervention provides education about common responses to trauma in order to normalize symptoms and teaches individuals anxiety management techniques such as deep breathing and muscle relaxation. ARTAT specifically avoids encouraging people to process the trauma (given evidence that this may enhance arousal). There is evidence that this type of anxiety management approach is effective in treating panic disorder and in ameliorating symptoms of chronic PTSD, and such tools are likely to be seen by participants as useful, empowering, and a non-stigmatizing way to cope with the common reactions to trauma.

This study is a randomized controlled trial of a single session 60- minute Anxiety Reduction Treatment for Acute Trauma (ARTAT) administered during Emergency Department (ED) admission to patients presenting with anxiety following traumatic exposure. Thirty-six participants will be enrolled over a 12-month period (18 receiving ARTAT and 18 receiving TAU). The study will target anxious arousal in patients immediately (1 to 8 hours) following a trauma. Participants will be recruited from among patients who present in the Bellevue Emergency Department for treatment of an injury sustained in a traumatic event (accident, assault) as long as injuries do not preclude participation. Participants included in the study will have experienced a trauma within 8 hours and presenting with signs of a strong risk factor for PTSD: peritraumatic panic (severe psychological and physiological anxiety symptoms such as fear of dying, fear of losing emotional control, tachycardia, sweating, shaking and dissociation symptoms such as derealisation and depersonalization that occur during and immediately following a trauma. Following the initial assessment, eligible participants will be randomized to receive the one-hour anxiety-reduction intervention designed to reduce anxiety and panic symptoms through education and anxiety y management skills or the TAU. The clinician administered and self-report assessments will be conducted at screening, baseline, post-treatment, and at a one-month and three-month follow-up.

If ARTAT is successful at preventing PTSD symptoms in civilians, it will be modified for military personnel with persistent emotional distress immediately following combat operations. The aim will be to increase resilience for current mission operations, increase readiness for future deployments, and prevent occupational/social disability and stress related physical health problems associated with combat related PTSD. It is hypothesized that: (1) ARTAT will result in significantly decreased anxious arousal immediately following the intervention and (2) Reduction in anxiety following the intervention will be associated with fewer acute distress disorder (ASD) and PTSD symptoms at follow-up.

Primary Aims:
1. To manualize a cognitive-behavior therapy (CBT) based behavioral intervention for adults experiencing peritraumatic anxiety in the immediate aftermath of a traumatic event.
2. To conduct a randomized controlled trial in a New York City emergency department setting with 18 patients receiving ARTAT and 18 patients receiving Treatment As Usual (TAU)
3. To determine if ARTAT results in immediate anxiety reduction in the ED
4. To determine if anxiety reduction in the ED predicts lower levels of PTSD symptoms at one month and three months.

BODY: KEY RESEARH ACCOMPLISHMENTS

2009-2010

This grant endured a major transition over the course of the first year of the award, 2009-2010. To summarize, this grant was awarded to Dr. Marmar while he was working as Professor and Vice Chair of Psychiatry at the San Francisco VAMC/University of California, San Francisco (UCSF). In November of 2009 we received IRB approval from both the Committee at UCSF and the SFVA. On November 30, 2009 we received confirmation that the IRB documents were submitted for review with the DOD. While this grant was awarded, we made significant progress toward achieving the first objective described in the Scope of Work: To manualize the CBT based behavioral intervention and complete programmatic pre-launch infrastructure, first in San Francisco and again in NYC in 2010. While in San Francisco, the staff prepared to work on the project included the project coordinator and research assistant. The IRB approval within the UCSF and SFVAMC took several submissions to obtain final approval. In addition, the staff met with the San Francisco General Hospital (SFGH) Emergency Department Staff to finalize recruitment procedures. Lastly, an application for a no-cost extension was granted in November of 2009.

In December of 2009 Dr. Marmar transitioned to a new position as Chair of the Department of Psychiatry at New York University Medical Center (NYUMC). Hence, the efforts focused on relinquishment of this grant from the DOD and Northern California Institute for Research and Education (NCIRE) and the transfer of this grant to NYU. The process to transfer this grant entailed several meetings with NCIRE and NYU contracts and grants specialists, reworking the budget and budget justification for NYU and resubmitting all documentation to NYU and the DOD for final approval of the transfer of this grant. Following the successful grant transfer to NYU, the Principal Investigator and Co-Investigator, Dr. Henn-Haase met with the Emergency Department personnel to establish networks to accomplish this study through Bellevue Hospital.

Tremendous progress was made during 2009-2010 following the grant transfer to NYU. Several personnel were hired and trained to work on the grant including the postdoctoral fellow who assisted with project management and administering the clinical intervention, the research assistant, project manager, and a few psychologists and postdoctoral fellows

were recruited through the NYU PTSD research program to help with the daytime on-call clinical responsibilities. We submitted and received IRB approval from both NYU and Bellevue Hospital on August 3rd 2010 and submitted the protocol to the DOD on August 5th 2010 for final approval. Weekly project meetings were chaired by the PI to move forward with finalizing the adaptation of procedures to Bellevue ED and preparing to establish a secure tracking database and data infrastructure to download all pertinent data for analyses.

2010-2011

We received full IRB approval for the study from NYUMC, Bellevue Hospital, and the DOD in January 2011. The IRB process was much slower than anticipated due to several modifications requested by the IRB boards. During the IRB process the remainder of the study team, project coordinator and on-call clinicians was hired and trained in both the clinical assessment and treatment intervention procedures. In addition, the Principal Investigator and Co-Investigator maintained collaborations with the Bellevue Emergency Department key personnel, weekly study meetings with the project team and monthly meetings with the study team and key personnel at Bellevue Hospital. The database manager developed the tracking databases and teleform system for data entry.

Prior to launching the study, the study team met with the Bellevue Emergency Department Volunteer Services staff to develop strategies to utilize their volunteers (medical students) working in the ED to recruit patients for the study. Over the course of several discussions, a training plan was developed and the study team provided two one and a half hour trainings for the volunteers that included didactics, demonstrations for approaching potential patients in the ED, and role-plays. The study team received positive feedback on the training and our research assistant was assigned to maintain collaborations with the volunteers by meeting with them regularly in the ED.

After launching the study in February 2011, the study team learned that the recruitment system was under utilizing the on-call clinicians. We received fewer calls using our on-call cellular phone system than expected. Over the course of the months of February and March we received 8 calls. We approached or recruited all 8 potential patients in the ED who were admitted following some sort of accident. One participant consented and considered a pilot for the assessment portion of the study. The participant assessed was randomly assigned to the TAU group and was ruled out due to receiving anxiolytics and narcotics while in the ED. Overall, we found that 3 participants refused participation and did not want to stay in the ED for the assessment and intervention and the other 5 potential participants met our exclusionary criteria for having a heart rate (HR) lower than 85, were administered narcotics for pain or did not speak English. To extend our recruitment to a wider population presenting to the ED, we revised the protocol to include participants with a HR of 80 or higher upon admission to the ED. In addition, we concluded from our experience that we needed to have an on-call clinician physically located in the ED during their busier times of day to increase the potential for successful recruitment on site. Both of these modifications were submitted and approved by the IRB's.

In April, the study team was advised of a change in credentialing policy and to discontinue the intervention until all clinical personnel and co-investigator supervising the clinical staff

were credentialed at Bellevue Hospital. Prior to this point, the clinical team worked under the Co-Investigator and Emergency Department Director, Chris McStay, M.D. The credentialing process significantly delayed the study for nine months.

The implementation phase of ARTAT was fully operational during 2011-2012. During this year of the grant we accomplished several milestones and goals. These accomplishments are detailed below:

2011-2012

1. IRB

The continuation application for the study was reviewed by all sites (NYU, Bellevue Hospital, and DOD) and approved.

2. Communication Strategies

Weekly meetings took place between the PI and clinicians. Meetings focused on issues related to calibration of clinical interviewing across sites, strategies for maintaining a high rate of subject recruitment and enrollment, strategies for maximizing participation and ensuring that participants moved through all follow-up time points of the study quickly and efficiently (in order to avoid attrition).

3. Clinical team

Four clinicians, licensed above postdoctoral level, collectively was present in the Bellevue ED for 33 hours/week covering shifts that extended beyond regular working hours, in order to identify and approach potential study recruits. The clinical team started to actively recruit participants at the end of January 2012 due to a long approval process to becoming credentialed at the Bellevue ED Hospital before working with patients.

4. Recruitment of Subjects

According to the Statement of Work, the goal of this grant is to enroll 36 study participants. During this year of the grant 34 participants meeting all study criteria were recruited and enrolled in the study. After randomization 17 of those participants were assigned to the ARTAT intervention condition and 17 to the TAU condition. Of the 34 participants who completed the baseline procedures, 4 dropped out following baseline and 2 participants were ruled out due to language barriers and did not experience an acute reaction to the trauma.

5. Follow-up Assessments of Subjects

Of the 33 subjects who completed baseline procedures, 6 subjects (3 ARTAT and 3 TAU) completed follow-up measures at all time points. Week one follow-up assessments were completed by 21 participants (11 ARTAT and 10 TAU), 22 participants completed Week 2

(13 ARTAT and 9 TAU), and 15 participants completed Week 3 (7 ARTAT) and 8 TAU). Eighteen subjects completed the 1 month time point (10 ARTAT and 8 TAU) and 7 completed the 3 month time point (3 ARTAT and 4 TAU).

6. Data Management

All Clinical Assessment data from the baseline interview and follow-up time periods for all study participants were completed and entered as digital data directly into the study secure SQL database server. Study data was cleaned and approved by the PI on the study. All data was prepared to be scored by the biostatistician for preliminary analyses. For quality control purposes, the ARTAT intervention was audio recorded and reviewed for clinical adherence. The one month and 3 month follow-up calls were audio recorded as well for adherence purposes.

2012-2013

Institutional Review Board (IRB) Approval:
Approval for Continuing Review was granted from the NYU IRB on April 23rd, 2013. This approval allows for the study to remain open for data analysis only, as we are no longer recruiting or enrolling subjects. The study protocol was renewed for Continued Implementation by Bellevue Hospital on May 3rd, 2013, and has met the NYC Health and Hospitals Corporation (HHC) criteria for having no substantial changes. Approval for Continuing Review was also submitted to the DoD on April 26, 2013.

Problems Encountered During 2012
Bellevue suffered severe storm damage following Hurricane Sandy in October 2012. Due to storm surge damage and loss of emergency electrical power in October from Hurricane Sandy, Bellevue Hospital, including fully operational emergency services at the ED, was closed until early March 2013. As a result recruitment efforts for the ARTAT study were stopped.

Sample Size
Please see table below for details on total sample:

ARTAT Recruitment, Enrollment & Retention Report

Consented/Enrolled	43	**(Enrolled in study including Drop-outs + Rule-outs)**
Eligible/active subjects	**36**	**18 TAU, 18 ARTAT**
Completed all Study time points	**8**	**5 TAU, 3 ARTAT**

Pilot	1	TAU (only baseline procedures)
Drop-outs	4	Left the ED early or decided not to do study after consenting
Rule-out	2	Did not speak adequate English; No A2
Refused	**143**	

Follow-up Calls Completed

Group	Baseline	Wk1	Wk2	Wk3	1M	3M
ART	**18**	**11**	**14**	**7**	**11**	**6**
TAU	**18**	**11**	**10**	**9**	**10**	**7**
TOTAL	**36**	**22/36 (61%)**	**24/36 (67%)**	**17/36 (47%)**	**21/36 (58%)**	**13/36 (36%)**

Data Management
Clinicians entered clinical data electronically into the database after cases were reviewed during the weekly supervision and calibration meetings.

Adherence
Adherence ratings on the CAPS measures conducted at 4 and 12 weeks post intervention have been completed on the ARTAT participant data with adherence ratings of .77.

Treatment Fidelity
Treatment fidelity has been conducted on the ARTAT group. The audio files of baseline intervention procedures have been reviewed by independent raters for adherence and achieved the goal of >.80 adherence ratings.

Data Quality Assurance
Below is a list of these Q&A aspects that were followed to ensure the quality of the data collected:

1) All clinicians were trained and closely supervised by the Project Clinical Director, Dr. Clare Henn-Haase. All interviewers were licensed, doctoral-level mental health clinicians experienced in working with trauma survivors.
2) Procedures and Operating Manuals were provided to all clinicians and included all assessment measures and intervention materials.
3) Assessments and the intervention were audio recorded by the clinicians. These audio recordings were reviewed by a supervising psychologist until the clinical team was fully calibrated. The NYU team conducted weekly meetings with clinical interviewers for

establishing diagnostic consensus. Discrepancies that result from the evaluation of participants were resolved by group consensus at these meetings.

4) In order to ensure consistency and accuracy of the clinicians' ratings on the intervention and CAPS measures, audio files were reviewed for adherence and to establish levels of inter-rater reliability.

5) Prior to final data submission into the database, all study forms were thoroughly reviewed by Dr. Clare Henn-Haase and appropriate levels of revisions and data management were implemented whenever necessary.

6) Reports and queries from the data base were conducted regularly to check for any missing or duplicate data. The reports were shared with the clinical director during meetings to discuss data quality issues and actions were taken to correct any data entry errors and discrepancies.

Data Analysis Plan

Hypothesis 1: ARTAT will result in significantly decreased anxious arousal immediately following the intervention.

The BAI score and SUDS score were summarized using mean and standard deviation. We compared the BAI score and the SUDS score before the treatment and immediately after the treatment using the Wilcoxon signed rank test for the ARTAT group and the TAU group, respectively. The BAI score difference and SUDS score difference between the pre-treatment and the post-treatment at week 0 was compared between the ARTAT group and the TAU group using Wilcoxon Mann-Whitney test.

Hypothesis 2: The ARTAT intervention will be associated with few acute stress disorder and PTSD symptoms at follow-up.

Continuous variables were summarized using mean and standard deviation and compared across groups using the nonparametric Wilcoxon Mann-Whitney test. The interaction between groups and time for the BAI score are evaluated using the Analysis of Variance (ANOVA) model. In the ANOVA model, the response variable is the BAI score and the predictor variables include the group, time and the interaction between group and time.

Hypothesis 3: Reduction in anxiety following the intervention will be associated with lower levels of ASD symptoms at one month and PTSD symptoms at three months after the interventions.

A linear mixed effect model was used to evaluate the association between the reduction in anxiety following the intervention and PTSD symptoms at follow-up. Separate models were fit with the acute stress disorder (ASD) score and the PCL score as dependent variables. Define the variable BAI difference= BAI score in the post-treatment at week 0- BAI score in the pre-treatment. The fixed-effect predictors include the treatment condition, time point, BAI difference, the interaction between BAI difference and time, the pre-treatment BAI

score. Random intercept was assumed to explain within-subject correlation among repeated measurements and among-subject heterogeneity.

We use the significance level 0.05 to declare significance for all tests and analyses. Statistical analyses were conducted using SAS (version 9.2).

Secondary Hypothesis : Homework compliance (as measured by number of reported hours of practice) will be associated with PTSD outcome measures at one-month follow-up.

The linear regression is used to analyze whether homework compliance (as measured by the average number of reported hours of practice per day in the first one month) is associated with PTSD outcome measures including PCL score and ASD score at one-month follow-up. In the linear regression model, the PTSD outcome measure is used as the response variable and the homework compliance is used as the predictor variable.

Results

The demographic analysis was performed for baseline visits. Continuous variables were summarized using mean and standard deviation (SD) and compared across groups using Wilcoxon rank sum test. Categorical variables were summarized by counts and proportions and compared across groups using Fisher exact test. The demographic analysis result is shown in the table below.

Variable	Overall Sample	ARTAT	TAU	p-value
	N=36	**N=18**	**N=18**	
Age				
Mean(SD)	40.6(15.4)	42.4(15.0)	38.8(16.0)	0.39
Gender N(%)				0.24
Female	11 (30.6)	4(22.2)	7(38.9)	
Male	25(69.4)	14(77.8)	11(61.1)	
Race				0.2
White	21(58.3)	12(66.7)	9(50.0)	
Black	9(25)	2(11.1)	7(38.9)	
Asian	2(5.6)	1(5.6)	1(5.6)	
Other	4(11.1)	3(16.7)	1(5.6)	
Ethnicity N(%)				0.24
Hispanic	13(36.1)	8(44.4)	5(27.8)	
Non-hispanic	23(63.9)	10(55.6)	13(72.2)	
Relationship N(%)				0.22
Single	19(52.8)	9(50.0)	10(55.6)	

Variable	Overall Sample	ARTAT	TAU	p-value
Married	11(30.6)	7(38.9)	4(22.2)	
Divorced	2(5.6)	0(0)	2(11.1)	
Steady	1(2.8)	1(5.6)	0(0)	
Living together	1(2.8)	1(5.6)	0(0)	
Widow	2(5.6)	0(0)	2(11.1)	
Education N(%)				0.73
up to 12th grade	3(8.3)	1(5.6)	2(11.1)	
H.S. diploma or GED	7(19.4)	3(16.7)	4(22.2)	
2 years college	11(30.6)	5(27.8)	6(33.3)	
4 years college	9(25.0)	4(22.2)	5(27.8)	
Master degree	5(13.9)	4(22.2)	1(5.6)	
Doctoral degree	1(2.8)	1(5.6)	0(0)	
Children N(%)				0.74
Yes	17(47.2)	9(50.0)	8(44.4)	
No	19(52.8)	9(50.0)	10(55.6)	

Type of Trauma Experienced by Enrolled Participants

Trauma Type	# Subjects
Fall	**5**
Laceration	**2**
Electrocution (cooking)	**1**
Hit by Fallen Object	**2**
Construction Explosion	**1**
Physical Assault	**2**
Vehicle Accidents	**23**
Bike	8
Pedestrian	8
Car	7
Total	**36**

Hypothesis 1: ARTAT will result in significantly decreased anxious arousal immediately following the intervention.

BAI Analyses

To address this hypothesis, the nonparametric Wilcoxon Mann-Whitney test was used to compare BAI scores between the ARTAT group and the Treatment as Usual (TAU) group.

This test was utilized since the BAI scores did not follow a normal distribution in each group. The comparison of BAI scores pre- and post-treatment at the baseline timepoint between ARTAT and TAU is summarized in Table 1.1 below. The significance level of p = 0.05 was used to declare significance for all tests and analyses.

Table 1.1. Comparison of BAI scores pre- and post-treatment at baseline for ARTAT vs. TAU.

	ARTAT		TAU		P-value
Time Point	N	mean (sd)	N	mean (sd)	
Week 0, before treatment	18	13.89(9.97)	18	11.94(7.78)	0.72
Week 0, after treatment	17	9.47(10.24)	15	8.27(10.07)	0.61

Then, the change in BAI scores pre- to post-treatment at the baseline timepoint was calculated for ARTAT and TAU. The summary statistics for the change in BAI scores pre- to post-treatment at baseline for ARTAT and TAU are shown in Table 1.2 below.

Table 1.2. Change in BAI from pre- to post-treatment at baseline for ARTAT and TAU.

Change in BAI pre- to post-treatment				
Group	N	Mean	Median	Std Dev
ARTAT	17	-4.588	-5	7.281
TAU	15	-3.8	-5	5.735

To determine whether the BAI scores significantly dropped from pre-treatment to post-treatment, the Wilcoxon signed rank test was used. The p value was 0.0215 for ARTAT and 0.0271 for TAU. Therefore, the BAI scores dropped significantly from pre- to post-treatment for both ARTAT and TAU.

To test whether the change in BAI scores pre- to post-treatment differed significantly between ARTAT and TAU, the Wilcoxon Mann-Whitney test was used. The p value was 0.733 for this test. Therefore, the change in BAI scores pre- to post-treatment was not found to differ significantly between ARTAT and TAU.

SUDS Analyses

The nonparametric Wilcoxon Mann-Whitney test was also used to compare the SUDS scores between ARTAT and TAU. This test was utilized since the SUDS scores did not follow a normal distribution in each group. The comparison of SUDS scores pre- and post-treatment at the baseline timepoint between ARTAT and TAU is summarized in Table 1.3 below.

Table 1.3. Comparison of SUDS scores pre- and post-treatment at baseline for ARTAT vs. TAU.

	ARTAT		TAU		P-value
	N	mean (sd)	N	mean (sd)	
Week 0, before treatment	18	4.72(1.99)	18	4.00 (2.99)	0.34
Week 0, after treatment	18	3.78 (2.78)	15	3.20 (2.57)	0.56

Then, the change in SUDS scores from pre- to post-treatment at baseline was calculated. The summary statistics for the change in SUDS from pre- to post-treatment for ARTAT and TAU are shown in Table 1.4 below.

Table 1.4. Change in SUDS from pre- to post-treatment at baseline for ARTAT and TAU.

Analysis Variable : SUDS difference				
Group	N	Mean	Median	Std Dev
ARTAT	18	-0.944	-1.5	2.261
TAU	15	-0.4	0	2.586

To determine if the SUDS scores dropped significantly from pre- to post-treatment, the Wilcoxon signed rank test was employed. For ARTAT, p = 0.095, and for TAU, p = 0.668. Therefore, the SUDS scores were not found to drop significantly in either ARTAT or TAU.

Analyses were also used to determine whether the change in SUDS scores pre- and post-treatment differed significantly between ARTAT and TAU using the Wilcoxon Mann-Whitney test. The p value for this test was 0.62. Therefore, the change in SUDS scores from pre- to post-treatment did not differ significantly between ARTAT and TAU.

Heart Rate Analyses

The nonparametric Wilcoxon Mann-Whitney test was also used to compare participants' heart rates between the ARTAT and TAU. This test was utilized since participant's heart rates did not follow a normal distribution in each group. The comparison of heart rates pre- and post-treatment at the baseline timepoint between ARTAT and TAU is summarized in Table 1.5 below.

Table 1.5. Comparison of heart rate pre- and post-treatment between ARTAT and TAU.

	ARTAT		TAU		P-value
	N	mean (sd)	N	mean (sd)	
Week 0, before treatment	17	78.18(11.02)	17	80.53(16.82)	0.92
Week 0, after treatment	18	70.00(17.53)	13	72.23 (11.02)	0.52

Next, the change in participants' heart rates from pre- to post-treatment at baseline was calculated. The summary statistics for this variable are presented in Table 1.6.

Table 1.6. Change in heart rate from pre- to post-treatment at baseline for ARTAT and TAU.

Analysis Variable : heart rate change				
Group	**N**	**Mean**	**Median**	**Std Dev**
ARTAT	17	-7.59	-6.00	18.94
TAU	13	-8.23	-2.00	18.88

To determine if participants' heart rates dropped significantly from pre- to post-treatment, the Wilcoxon signed rank test was used. For ARTAT, p = .12, and for TAU, p = .23. Therefore, the heart rates did not drop significantly after the treatment in either group, ARTAT or TAU.

Analyses were also used to determine whether the change in heart rates pre- and post-treatment differed significantly between ARTAT and TAU using the Wilcoxon Mann-Whitney test. The p value is 0.97. Therefore, the change in heart rates from pre- to post-treatment did not differ significantly between ARTAT and TAU.

In summary, the BAI scores significantly dropped from pre- to post-treatment for both ARTAT and TAU. However, there was no significance difference between ARTAT and TAU for the degree of change in BAI scores pre- to post-treatment. Additionally, no significant differences were found for the SUDS scores pre- and post-treatment for ARTAT or TAU, and the degree of change in SUDS scores from pre- to post-treatment did not significantly differ between ARTAT and TAU. Furthermore, no significant differences were found for the heart rates pre- and post-treatment for ARTAT or TAU, and the degree of change in heart rates from pre- to post-treatment did not significantly differ between ARTAT and TAU.

Hypothesis 2: The ARTAT intervention will be associated with fewer Acute Stress Disorder and PTSD symptoms at follow-up.

To address this hypothesis, scores on the PCL, ASD, BAI , and SUDS were compared between the ARTAT and TAU groups at each time point using the nonparametric Wilcoxon Mann-Whitney test. The results of these analyses are shown in the following tables.

Table 2.1. Comparison of PCL scores at 1-month follow-up, ARTAT vs. TAU.

	ARTAT (n=12)	**TAU(n=10)**	**P value**
Patient self-reported PTSD Checklist (PCL)	32.92(15.91)	29.80(12.26)	0.72

Table 2.2. Comparison of ASD scores, ARTAT vs. TAU.

	ARTAT		TAU		P-value
Time Point	**N**	**mean (sd)**	**N**	**mean (sd)**	
Week 1	10	8.9(2.6)	11	5.64(5.26)	0.06
Week 2	13	7.15(5.24)	10	6.6 (5.46)	0.71
Week 3	6	4.33 (4.03)	10	5.80 (5.88)	0.74
Week 4	10	6.90(5.86)	10	4.80 (4.16)	0.52

Table 2.3. Comparison of SUDS score, ARTAT vs. TAU.

	ARTAT		TAU		P-value
Time Point	**N**	**mean (sd)**	**N**	**mean (sd)**	
Week 0, pre-treatment	18	4.72(1.99)	18	4.00 (2.99)	0.34
Week 0, post-treatment	18	3.78 (2.78)	15	3.20 (2.57)	0.56
Week 1	10	4.60(2.63)	11	4.00 (2.24)	0.64
Week 2	13	4.31(2.39)	10	4.30(2.67)	0.92
Week 3	6	3.00(2.10)	10	3.50(2.99)	0.78
Week 4	11	3.36 (2.54)	10	4.00(3.62)	0.89
Week 12	6	3.50(2.35)	6	4.83(3.31)	0.4

Table 2.4. Comparison of BAI scores, ARTAT vs. TAU.

	ARTAT		TAU		P-value
Time point	**N**	**mean (sd)**	**N**	**mean (sd)**	
Week 0, pre-treatment	18	13.89(9.97)	18	11.94(7.78)	0.72
Week 0, post-treatment	17	9.47(10.24)	15	8.27(10.07)	0.61
Week 4	11	38.7(16.2)	10	37.4(13.9)	0.92

The ANOVA model was used to test the treatment group (ARTAT versus TAU) and time interaction for the BAI score. At week 0, the BAI scores has two values, pre-treatment and post-treatment. The p value is 0.92 when the BAI scores at week 0 (before the treatment) and BAI scores at week 4 are used for the analysis. The p value is 0.986 when the BAI scores at week 0 (after the treatment) and BAI scores at week 4 are used for the analysis.

The analyses above do not support the hypothesis the ARTAT intervention would be associated with fewer ASD and PTSD symptoms at follow-up.

Hypothesis 3: Reduction in anxiety following the intervention will be associated with lower levels of ASD symptoms at one month and PTSD symptoms at three months after the interventions.

A linear mixed effect model was used to evaluate the association between the reduction in anxiety following the intervention and acute stress disorder and PTSD symptoms at follow-up. Separate models were fit with the acute stress disorder (ASD) scores and the PCL scores as dependent variables. The estimated regression coefficients (fixed effect) and p value for the interaction between BAI difference and time are shown in the table below.

Table 3.1. Estimated regression coefficients (fixed effect) and p-value for the interaction between BAI difference and time.

Response Variable	Coefficient	P-value
PCL score	0.0033	0.96
ASD score	-0.027	0.517

The p-values in Table 3.1 are not significant, and the results do not support Hypothesis 3.

Secondary Hypothesis: Homework compliance (as measured by number of reported hours of practice) will be associated with PTSD outcome measures at one-month follow-up.

Sixteen subjects completed the homework compliance information. Eleven subjects had both the homework compliance information and the PCL scores information. Ten subjects had both the homework compliance information and the ASD information.

The linear regression was used to analyze whether homework compliance (as measured by the average number of reported hours of practice per day in the first one month) was associated with PTSD outcome measures, including PCL and ASD scores at one-month follow-up. In the linear regression model, the PTSD outcome measure was used as the response variable and the homework compliance was used as the predictor variable. The estimated coefficients are shown in the Table 3.1 and Table 3.2 below.

No significance was observed, and the hypothesis was not supported.

Table 4.1. Regression Estimates and P-value of the linear regression when the PCL scores is used as the response variable.

	Coefficients	Standard Error	P value
Reported hours of total practice per day	0.97	0.689	0.19
Reported hours of read materials per day	0.161	0.173	0.377
Reported hours of practiced breathing per day	0.143	0.081	0.11
Reported hours of practiced grounding per day	0.21	0.132	0.146
Reported hours of practiced worry control per day	-0.072	0.413	0.865
Reported hours of Used positive coping per day	0.013	0.013	0.337

Table 4.2. Regression Estimates and P-value of the linear regression when the ASD scores is used as the response variable.

	Coefficients	Standard Error	P-value
Reported hours of total practice per day	0.056	0.284	0.848
Reported hours of read materials per day	0.013	0.067	0.847
Reported hours of practiced breathing per day	0.014	0.034	0.684
Reported hours of practiced grounding per day	0.021	0.054	0.708
Reported hours of practiced worry control per day	-0.033	0.151	0.831
Reported hours of Used positive coping per day	0.0005	0.005	0.919

Table 4.3 The mean time (minutes) and standard deviation of each homework category that subjects spent on each week is shown below.

Homework skills	Mean (mins)	Std Dev
reading	115.58	282.26
breathing	158.76	376.13
grounding	100.51	249.99
control	88.09	231.33
coping	266.78	427.42

Table 4.3 describes the descriptive statistics for the weekly time spent in minutes on each homework category.

Discussion

The purpose of this pilot study was to investigate the feasibility and effectiveness of a brief Anxiety Reduction Treatment for Acute Trauma (ARTAT) with adults (over age 18) showing signs of peritraumatic anxiety in the Emergency Department in the hours following a psychologically traumatic event. While we found that it is feasible to conduct a brief anxiety reduction intervention in the ER, we would recommend changes in the procedures including a delay in the administration of the intervention. A number of factors became apparent as we reviewed the demographic makeup of our small sample and results of the study.

First, our recruitment was limited to less severe traumas and to those participant who did not have severe physical or medical injuries. Patients admitted to the trauma unit with severe injuries and who required immediate medical attention were not appropriate to be referred to the study. Therefore, our sample was limited to participants who may have experienced milder acute trauma reactions at the time of their accident or physical assault, thus this bias needs to be taken into consideration.

Additionally, those participants who did not have a relative or friend with them in the ER were more likely to enroll in the study, indicating the role of social support is an important factor in the immediate aftermath of a trauma. There is strong evidence that lack of social support is a risk factor for developing PTSD (Ozer, Best, Lipsey, & Weiss, 2003; Brewin, Andrews, & Valentine, 2000; Markowitz , Milrod, Bleiberg, Marshall, 2009). A large meta-analytic study found that a lack of social support was the largest single predictor of developing PTSD following a traumatic event (Brewin et al., 2000). Therefore, it may be important to provide some type of interpersonal support to patients admitted to the ED following a traumatic event.

The negative findings related to our hypotheses are discussed with caution and as preliminary due to the very small sample size at follow-up timepoints. There is a negative finding for the first hypothesis that *ARTAT will result in significantly decreased anxious arousal immediately following the intervention.* The result of this hypothesis is based on self-reported Subjective Units of Distress Scale (SUDS) ratings and self-reported ratings on the Beck Anxiety Inventory (BAI). Only the anxiety symptom ratings decreased following the intervention. However, there was not a significant difference between the ARTAT participants and those who did not receive the intervention (TAU). The finding may suggest that an intervention may slightly decrease anxiety for people who experience an accident or physical assault; however this reduction may be due to the factor of time or to social support more generally from clinicians in the ER. The analyses on heart rate change from pre- (upon admission to the ER) to post- treatment (upon discharge) was not significant; however the HR did decrease to the same extent for both groups. A larger sample with biological markers of stress may help determine whether or not an intervention provided in the ER could significantly reduce symptoms.

Results from the study did not support the second hypothesis, *the ARTAT intervention will be associated with few acute stress disorder and PTSD symptoms at follow-up.* We did not find a significant reduction in acute stress and PTSD symptoms at 4 weeks; however there was a reduction in symptoms of distress (SUDS) for both groups and slightly higher reduction in the ARTAT group. The anxiety symptoms (BAI) scores increased between ratings obtained at baseline. Again, we are limited to the small sample size and factors related to attrition rates at 4 weeks. Other factors to consider were reported life circumstances during follow-up calls unrelated to their traumatic event potentially increasing anxiety symptoms. We did not find a significant reduction in acute stress and PTSD symptoms at 4 weeks. During the 4 and 12 week follow-up, the CAPS was obtained to measure PTSD symptoms. Although the sample was too small to analyze the data, there was a reduction in symptoms over time, particularly between 4 and 12 weeks for some participants in the ARTAT group.

The third hypothesis stated that *reduction in anxiety following the intervention will be associated with lower levels of ASD symptoms at one month and PTSD symptoms at three months after the interventions.* A significant decrease in symptoms of acute stress and posttraumatic stress was not found at 4 weeks; however symptoms of acute stress decreased on the measure of Acute Stress Disorder (ASD) from a mean of 8.9 during week one to 6.9 at 4 weeks post-intervention. Interestingly there was a trend toward significance in reduction of acute stress symptoms between groups favoring the TAU group at the one week follow up ($p = .06$) suggesting participants in the TAU group were feeling less acute stress one week post intervention. The sample size limits interpretation of this trend; however one speculation may be that symptoms can often increase before feeling some relief through the use of cognitive behavioral skills to reduce stress. During the 4 and 12 week follow-up, the CAPS was obtained to measure PTSD symptoms. Although the sample was too small to analyze the data, there was a reduction in symptoms over time, particularly between 4 and 12 weeks for some participants in the ARTAT group.

A secondary hypothesis suggested that *homework compliance (as measured by number of reported hours of practice) will be associated with PTSD outcome measures at one-month follow-up.* We examined the amount of time spent completing the homework (practice of the 4 skills: deep breathing, grounding, worry control, and positive coping) following the intervention for the participants in the ARTAT group over time; however, a significant correlation was not found with the amount of time practicing homework and posttraumatic stress symptoms, as measured on the ASD and PCL. In general, participants did not complete homework consistently on a weekly basis, and the small sample at follow-up places limitations on the analyses of this data. It does appear that positive coping by far exceeds the other skills in terms of follow-through with practicing the skill.

CONCLUSIONS

This pilot study yielded valuable information in a number of areas including recruitment, eligibility, feasibility of intervention in the ER, timing of intervention, and retention. These areas will be described below.

Recruitment

Recruitment in the ER proved to be more challenging than predicted. Although we had the opportunity to work in a large active ER that manages Level I trauma, most patients suffering from severe trauma were not physically capable of participating in an intervention due to the severity of their injuries and/or because their pain was being managed by narcotics resulting in decreased attention and fatigue. Those participants who did agree to enroll in the study experienced an acute reaction to the trauma at the time of the event, however often experienced a reduction in symptoms upon admittance to the ER. Based on these observations, we have learned that it may be more appropriate to obtain a verbal consent or very brief signed consent to be contacted within the next few days to one week to conduct the pre-intervention assessment and intervention. A number of patients who refused to participate in the study had supportive significant others with them while at the ER and felt more comfortable spending this time with their family or friends. However, we noticed that many of the participants who agreed to enroll were alone and did not have

anyone physically with them or were from another country. These observations are consistent with the literature indicating that a lack of support systems may be a risk factor for the development of PTSD following a trauma (Ozer, Best, Lipsey, & Weiss, 2003; Brewin, Andrews, & Valentine, 2000; Markowitz , Milrod, Bleiberg, Marshall, 2009). Based on our experience recruiting within the ER and the more recent literature published since the submission of this grant, we would recommend recruiting patients in the ER followed by a phone consent within the next 2-3 days which would allow for the recruitment of more severe trauma patients admitted to the ER who are not able to participate due to physical injuries. There is evidence that providing CBT treatment should not occur sooner than 2 weeks following a traumatic event (Watson & Shalev) therefore it may be useful to obtain the baseline assessment followed by the administration of the intervention 2 weeks post-event.

Eligibility: Secondarily, eligibility for more acute patients within this target population would increase if recruitment was conducted within the ED followed by enrollment at a later date.

Feasibility of Intervention in the ER

The feasibility of providing this intervention in the ER proved to be very challenging due to frequent interruptions and breaks in the assessment and/or intervention to allow the patient to meet with medical staff. While we found creative ways to provide the intervention in a very fast paced and chaotic environment at times, it was difficult to maintain the participant's attention and privacy was often a challenge with limited space to work around the medical personnel which took priority. Many patients were feeling fatigued, were in pain, and feeling anxious, therefore providing a lengthy detailed consent was difficult for many to comprehend at the moment, let alone able to remember the information provided to them during the consent and intervention. Based on the difficulties managing a trauma in an already chaotic environment, and the fact that many patients were medicated for pain, it seems that delaying the intervention until the patient is released from the ER or hospital may not only be more feasible but may provide a more successful intervention outcome.

Retention

We found that the retention rates significantly decreased after 4 weeks. Retention of this cohort was particularly challenging because some of the participants were likely following the normal recovery trajectory over time. Therefore, as they felt less anxious, there was less incentive to remain connected to continue the follow-up assessments. Some participants may have experienced the opposite, and possibly avoided contact due to increased anxiety or distress. We can only hypothesize a number of potential reasons why people dropped out after baseline through 3 months; however, we can reasonably speculate that participants may feel more engaged if they received an anxiety reduction intervention a few days post trauma while in a calm environment that is more conducive to providing effective treatment.

Limitations

This study has several limitations:

1. Small sample size restricts the data analyses and outcome measures.
2. The high attrition rates particularly at the 3 month follow up

3. Environmental limitations for administration of the intervention in ER
4. Self-reported measures during follow up without biological measures
5. Poor adherence for homework completion in the ARTAT group

Future Directions

Based on our experiences with recruitment in the ER and the results of our data analyses we would make the following recommendations:

1. Recruitment in the Emergency Department should entail brief contact and verbal consent to contact participants within 3-7 days to obtain a baseline assessment and follow-up measures. This would allow for more acute trauma cases to enroll in the study.
2. Obtain consent with family members and provide education on stress symptoms to track over time since they are often the primary social support for the participant. The family members or significant others may be the people assisting in processing the trauma and helping to find a sense of positive meaning in the events (Watson & Shalev)
3. Conduct the baseline assessment outside the ER setting.
4. Obtain physiological measures such as heart rate, cortisol, and lab reports available from the ER as baseline measures and conduct follow-up physiological measures to identify reduction in symptoms.
5. Train non-clinical staff to work with patients suffering from acute stress in the ER by simply lending support for patients throughout their admission into the ER while obtaining a measure of the impact of social support upon admission and discharge, and follow-up.
6. Use of programmed measures and homework tracking on the iPhone may facilitate the collection of data and adherence.

This proposal was submitted as proof of concept of ARTAT to be modified for military personnel with persistent emotional distress immediately following combat operations. Based on this small pilot it is difficult to know whether ARTAT would be successful with military personnel. The results indicate reduction in acute and posttraumatic symptoms; however the small sample size limits the conclusions. As pointed out earlier, we have learned a great deal through the implementation phase of this study and have several recommendations listed above to run a similar study and changing the procedures and/or providing such an intervention as a preventive measure while also building in a strong social support component. The aim of such an intervention with military personnel would be to increase resilience for current mission operations, increase readiness for future deployments, and prevent occupational/social disability and stress related physical health problems associated with combat related PTSD.

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APPENDIX

RELATED PUBLICATIONS 2006-2012

2012

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